

## **BIBLIOGRAPHY**

CAYATOC, JR MANUEL C. APRIL 2012. Growth Performance of Growing–Finishing Pigs Given Diets Supplemented with Sweet Potato Meal. Benguet State University. La Trinidad, Benguet.

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## **ABSTRACT**

The study was conducted to determine the effect of supplementing commercial rations of growing–finishing pigs with sweet potato meal. This was conducted at Banig Tawang, La Trinidad Benguet.

Nine 85 days old were distributed into three treatments following the completely randomized design (CRD). Each treatment was replicated three times with one pig serving as a replicate. The different treatments were pure commercial feeds, 150g sweet potato meal per kg commercial feeds (SPM/ kg CF) and 300g sweet potato meal per kg commercial feeds. The average daily gain of hogs used in the study was 0.83 kg with a conversion ratio of 3.14.

Statistical analysis showed no significant differences in the initial weight at 85 days of age, final weight at 150 days of age, gain in weight and, feed conversion ratio of hogs given pure commercial feeds and 150g or 300g SPM/ kg CF. However, significant difference was observed in the feed intake of pigs given pure commercial feeds and those given 300 g SPM/ kg CF. Average daily feed intake of pigs given 300 g SPM/ kg CF had

a higher daily feed intake of 2.69 kg. Compared to those given pure commercial feeds, and 150 g SPM/ kg CF with an average daily feed intake of 2.51 kg and 2.56 kg, respectively.

Feed cost per kg gain in pigs given pure commercial feeds was lower than those given 150g or 300g SPM/ kg CF. Likewise, return on investment (ROI) in pigs given pure commercial feeds was the highest ROI (23.13%) followed by 150g SPM/ kg CF (22.21%), and the lowest ROI (9.8%) was obtained from pigs given 300g SPM/ kg CF.

## INTRODUCTION

In the Cordillera, pig raising is one source of additional income for the family. However, pig raising is becoming more challenging because of the increasing cost of commercial feeds. Since feed cost accounts for about 70% of the total production cost, effects are channeled to finding ways to reduce feed cost.

One way to reduce feed expenses is to use a feed stuff that is locally available that are inexpensive. A potential feedstuff is sweet potato. Quinio (1986) as cited by Tabon (2008) reported that sweet potato meal is one of the most common and major crop grown in the Cordillera since time immemorial. This serves as a good source of nutrients both for humans and animals. Grown the whole year round, it is used for food consumption and as feed for domestic animals.

Sweet potato can provide enough nutrients needed by animals for maximum performance. It is good source of energy and protein which is also traditionally linked to pig production in developing countries. In the Cordillera it is a common feed for mature pigs, often gives as the sole feed. The energy that pigs can get from sweet potato meal is similar to what they get from cassava meal and maize.

It is therefore worth knowing if supplementing commercial swine rations would affect growth performance of the commercial breeds of swine

Data that will be generated from this study serves as a guide to swine raisers, students, and other individuals interested in swine production. It might also a way of reducing the problem on the high cost of feed. Considering that sweet potato is a common crop and can be grown with minimum inputs.

The study was conducted to determine the effect of supplementing commercial rations of growing- finishing swine with sweet potato meal. Specifically, the study aimed to:

- a. determine the response of hogs to different levels of sweet potato meal given as feed supplement in terms of gain in weight, feed intake and feed efficiency; and
- b. determine whether sweet potato meal could be profitable if used as feed supplement to commercial rations in growing – finishing pigs.

This study was conducted at Banig, Tawang, La Trinidad, Benguet from October 2011 to January 2012.

## REVIEW OF LITERATURE

Sweet potato is a creeping plant with perennial vines and adventitious roots on which swollen tubers are formed. The tubers are highly digestible and palatable, and an excellent source of energy. Although mainly grown as human food, surplus and cull tubers are used fresh or dry in livestock feed. Sweet potato leaves are an excellent food for ruminants, being high in protein, and calcium and highly digestible. Pigs can also graze the vines. Fresh tubers can replace up to a half the cereal in pig rations. Dried tubers can be mixed with molasses and urea up to a level of 50% of the concentrate for dairy cattle. Dried tubers have about 90% of the feeding value of maize for pigs and can constitute up to 60% of the ration. Fresh tubers are relatively bulky and are better utilized by mature pigs. Sweet potato is high in energy and a high- protein meal and is recommended that dietary intake be restricted to avoid the production of over fat carcasses. The metabolizable energy content of tubers of pigs is 15 MJ dry matter (Fuller, 2004).

Sweet potato is also one of the most versatile and nutritious food available. It has beta- carotene, vitamin A, and ascorbic acid which is incedently rice has none of these nutrients. Sweet potato synthesizes Beta carotene naturally. A 100g portion of the orange fleshed variety provides enough Beta carotene to produce up to 100% of the suggested daily Vitamin A requirement.

According to Gonzales and Masangcay (2010), that all plant parts of sweet potato are utilized as feeds for hogs, cows, rabbit, goat, etc. The daily feed given to pigs consists of fresh and sundried sweet potato chips, which contain about 334g crude protein and 8.5 m cal. These contents affect satisfactorily growth performance. Sundried sweet potato

chip is more economical than the fresh one. Back fat is significantly thinner in pigs with diets containing sweet potato. In Korea, sweet potato silage is utilized as feed. It was found out not only a good feed for hogs but also improves the meat quality. Also Tai and lei (1970), Reported that the back fat thickness of pigs becomes thinner as the portion of sweet potato chips is increased in the pig ration. Thinner back fat and a higher percentage of lean cut is obtain when the pig diet are formulated with sweet potato chips to substitute half or all of the corn.

In 1998, Dominguez found out that sweet potato root meal contain 5.0% of crude protein, 0.14% of calcium and 0.2% of phosphorous. On the study conducted by Giang, Ly, and Ogle (2002), they analyzed that sweet potato root meal contain 4.0% of CP, 4.0% C, and 23% of phosphorous in dry basis.

It was studied by Toribio (1980) that 30% of sweet potato root meal resulted in better dressing percentage and thinner back fat. The cost of ration to produce kg body gain weight was reduced when 30% sweet potato root meal was used in hog ration. In addition, Quinio (1986) studied that among the levels of sweet potato meal with commercial hog mash had a higher final weight and gain in weight.

## MATERIALS AND METHODS

### Materials Used

The materials used in the study include nine 85 days old large white piglets (6 females and 3 males), non- marketable sweet potato, commercial feeds, weighing scale, oven, feeding trough, disinfectants, stick broom, dust pan, and recording materials.

### Preparation of the Pens

Two weeks before the arrival of the experimental animals, the pens including the feeding troughs were thoroughly cleaned and disinfected.

### Experimental Design and Treatments

The nine weaned pigs were distributed into three treatments following the completely randomized design (CRD). Each treatment was replicated three times with one pig serving as a replicate. Each pig was confined in an individual pen.

The experimental animals were weighed first before placing them into their respective pens.

The treatments were as follows:

T<sub>0</sub>= 100% commercial feeds

T<sub>1</sub>= 150 g sweet potato meal/ kg of commercial feeds

T<sub>2</sub>= 300 g sweet potato meal/ kg of commercial feeds



### Preparation of the Ration

The sweet potato roots were collected from Bad - ayan Buguias, Benguet. It was washed and then grated. The grated sweet potato was sun - dried. After drying, it was ground to form a meal. The dried meal was mixed with the commercial feeds.

### Care and Management of Experimental Animals

The commercial feeds were given adlibitum. The specified amount of sweet potato meal was incorporated with the commercial feeds in the morning. The water was made available at all times. Cleaning was done every day to minimize the growth of parasites.

The following data were gathered:

1. Initial weight. It was taken by weighing the pigs at the start of the study
2. Final weight. It was taken by weighing the pigs at the end of the study
3. Amount of feed offered. It was taken by weighing the feed offered to the pigs from the start and at the end of the study.
4. Cost of inputs. This was determined by recording all the expenses incurred in the study.

The following data will be computed:

1. Feed Intake Consumption
  - a. Total feed intake (TFI). It was determined using the formula;  
$$\text{TFI} = \text{amount of feed offered} - \text{amount of feed leftover}$$
  - b. Daily feed intake (DFI). It was determined using the formula;  
$$\text{DFI} = \text{total feed intake} / \text{number of days of the experiment}$$





2. Gain in Weight

- a. Total gain (TG). It was determined based on the formula;

$$\text{TGW} = \text{final weight} - \text{initial weight}$$

- b. Average Daily gain (ADG). It was determined using the formula;

$$\text{DGW} = \text{total gain in weight} / \text{number of days of the experiment}$$

3. Feed Conversion Ratio (FCR). It was determined using the formula;

$$\text{FCR} = \text{feed intake} / \text{total gain in weight}$$

4. Feed cost per kg gain. It was determined using the formula;

$$\text{Feed cost} / \text{kg gain} = \text{FCR} \times \text{feed cost per kg of feeds}$$

5. Return on investment (ROI). It was determined using the formula;

$$\text{ROI} = (\text{gross sales} - \text{total expenses}) / \text{total expenses}$$



## RESULTS AND DISCUSSION

### Weight of Animals

Table 1 shows the initial and final weights of the experimental animals. Statistical analysis revealed no significant differences on the initial weight and final weights of the pigs given pure commercial feeds and those given 150g or 300g sweet potato meal per kg commercial feeds (SPM/kg CF). This implies that the pigs were more or less of the same weight at the start and at the end of the study. The average initial weight of the experimental animals was 21.42 at 85 days of age. The average final weight of the hogs at 150 days of age was 83.56 kg. The result of this study is similar with that of Pagaduan (2006) where he reported that pigs given rations that contain 10%, 20% and 30% sweet potato root meal from 90 to 150 days of age had the same final weight as those given diets with no sweet potato root meal.

Table 1. Weight of animals

TREATMENT	INITIAL WEIGHT AT 85 DAYS	FINAL WEIGHT AT 150 DAYS
100% commercial feeds	21.433 <sup>a</sup>	82.667 <sup>a</sup>
150g sweet potato meal/ kg CF	21.567 <sup>a</sup>	86.000 <sup>a</sup>
300g sweet potato meal/ kg CF	21.267 <sup>a</sup>	82.000 <sup>a</sup>



## Feed Consumption

Statistical analysis showed that there are significant differences in the total and daily feed intake of pigs among treatments. Pigs fed with 300g sweet potato meal per kg commercial feeds (SPM/ kg CF) had a total and daily feed intake of 201.867 kg and 2.69 kg, respectively. The daily feed intake of pigs given pure commercial feeds and 150 g SPM/ kg CF were 2.51kg and 2.56 kg respectively. This shows that when 300g of sweet potato is added to the diet, it increases the feed intake of the pigs.

The result of this study did not conform with the observation of Pagaduan (2006) where the inclusion of sweet potato meal on pig's diets did not affect the daily feed intake of pigs. Differences on the observation could be attributed to the differences on how sweet potato meal was included in the swine ration. In the former study the ration was formulated with 10%, 20% and 30% sweet potato meal, while in this study 150g and 300g sweet potato meal was added to commercial ration. It maybe that commercial feeds added with sweet potato meal was more palatable.

Table 2. Feed consumption of pigs for 75 days

TREATMENT	TOTAL FEED INTAKE	DAILY FEED INTAKE
100% commercial feeds	188.407 <sup>a</sup>	2.51 <sup>a</sup>
150g sweet potato meal/ kg CF	192.383 <sup>a</sup>	2.56 <sup>a</sup>
300g sweet potato meal/ kg CF	201.867 <sup>b</sup>	2.69 <sup>b</sup>



### Gain in Weight

The result on gain in weight is presented in Table 3. There are numerical differences among treatment means however statistical analysis revealed no significant differences as shown in the table. The total gain and daily gain in weight obtained from pigs fed with pure commercial feeds from 85 to 150 days old were 61.23 kg and 0.81, those pigs fed with 150g of sweet potato meal per kg commercial feeds (SPM/ kg CF) were 64.43 kg and 0.86 kg and then 300g SPM/ kg CF almost have the same total mean of 61.23 and 60.73 total gain, respectively. The average total and daily gain in weight for pigs from 85 to 150 days of age were 62.13 kg and 0.83 kg, respectively.

Dominguez in 1992 also reported that average daily gain in weight of pigs is high when feed with sweet potato.

Table 3. Gain in weight of pigs for 75 days

TREATMENT	TOTAL GAIN IN WEIGHT	DAILY GAIN IN WEIGHT
100% commercial feeds	61.233 <sup>a</sup>	0.81 <sup>a</sup>
150g sweet potato meal/ kg CF	64.433 <sup>a</sup>	0.86 <sup>a</sup>
300g sweet potato meal/ kg CF	60.733 <sup>a</sup>	0.81 <sup>a</sup>



### Feed Conversion Ratio

The observations in terms of feed conversion ratio during the growing to finishing period are presented in Table 4. Just like in the gain in weight, no significant differences were observed among the treatments as revealed by the statistical analysis. This reveals that the feed conversion ratio of the pigs were comparable to each other. The FCR of the pigs given pure commercial feeds, 150g sweet potato meal per kg commercial feeds (SPM/ kg CF) and 300g SPM/ kg CF from 85 to 150 days old were 3.07, 2.99 and 3.33, respectively with an average of 3.14.

This result reveals that the sweet potato meal maybe included as high as 300g of the pig ration without detrimental effect on the feed conversion ratio.

In terms of feed cost per kg gain in weight, pigs fed with 300g SPM/ kg CF had the highest cost of Php 100.20 this is due to the high cost of sweet potato meal. Pigs given pure commercial feeds and pigs given 150g SPM/ kg CF had feed cost per kilogram weight of Php 81.90 and Php 73.92, respectively.

Table 4. Feed conversion ratio

TREATMENT	FEED CONVERSION RATIO	FEED COST PER KG GAIN (Php)
100% commercial feeds	3.08	73.92
CF + 150g sweet potato meal/ kg CF	2.99	81.90
300g sweet potato meal/ kg CF	3.34	100.20



### Return on Investment

The return on investment is presented in Table 5. Although this was not subjected to statistical analysis, the result revealed that the highest ROI was realized from pigs fed with pure commercial feeds with a total mean of 23.43%. Although this was comparable to the pigs fed with 150g of sweet potato meal per kg commercial feeds (SPM/ kg CF) having a total mean of 22.21% ROI. The lowest ROI was obtained from pigs fed with 300g SPM/ kg CF with a total mean of 9.80% this is due to the high cost of sweet potato meal.

Table 5. Return on investment

TREATMENT	COST OF PRODUCTION	GROSS SALES	NET INCOME	ROI (%)
100% commercial Feeds	24,170.28	29,760.00	5,589.72	23.43
150g sweet potato meal/ kg CF	25,334.10	30,960.00	5,625.90	22.21
300g sweet potato meal/ kg CF	26,886.00	29,520.00	2,634.00	9.80



## SUMMARY, CONCLUSION AND RECOMMENDATION

### Summary

The study was conducted to determine the response of pigs to different levels of sweet potato meal and to determine whether sweet potato meal could be profitable if used as feed supplement to commercial rations in growing and finishing pigs.

Nine 85 days old pigs composed of 6 females and 3 males were distributed into 3 treatments following the completely randomized design (CRD). Each treatment was replicated three times with one pig per replicate. The treatments used were pure commercial feeds, 150 g sweet potato meal per kg commercial feeds (SPM/ kg CF) and 300 g SPM/ kg CF.

Statistical analysis showed that there were no significant differences between treatments in initial weight, final weight, gain in weight, and feed conversion ratio (FCR). However, there is a significant difference in the feed intake of the animals. Hogs given 300g SPM kg CF had the highest daily feed intake of 2.69 kg followed by hogs given 150g SPM/ kg CF with a total of 2.56 and those given pure commercial feeds with a daily feed intake of 2.51 kg. The average initial and final weights at 85 to 150 days were 21.42 kg and 83.56, respectively. Average total gain and daily gain in weights of hogs given pure commercial feeds, 150g SPM/ kg CF and 300g SPM/ kg CF were 62.13 kg, and 0.82 kg, respectively. The average FCR were 3.08, 2.99 and 3.34 respectively.

Feed cost per kg gain in pigs fed with commercial feeds was Php 73.29. And those given 150 or 300g SPM/ kg CF were Php 81.90 and Php 100.20, respectively. For return on investment (ROI), pigs fed with pure commercial feeds had a higher ROI of



23.43% followed by pigs fed with 150g SPM/ kg CF with ROI of 22.21%. The lowest ROI was realized from pigs fed with 300g SPM/ kg CF with ROI of 9.80%.

### Conclusion

From the result of the study, sweet potato meal can be given to at the rate of 150g to 300g per kg of commercial ration without any adverse effect on the pig performance.

### Recommendation

Based on the study 150g to 300g of sweet potato meal maybe added to commercial feeds if the cost of sweet potato meal is same or lower than commercial feeds. Studies using sweet potato meal as basal feed to swine is also recommended.





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